

Investigation

4

Looking Back at Functions

Throughout your work in algebra, you have identified patterns of change between variables as linear, exponential, and quadratic functions. You have used tables, graphs, and equations to represent and reason about these functions. In this unit, you have found that writing equivalent expressions for a quantity or variable can reveal new information about a situation. This investigation will help pull these ideas together.

4.1 Pumping Water

Every winter, Magnolia Middle School empties their pool for cleaning. Ms. Theodora's math class decides to collect data on the amount of water in the pool and how long it takes to empty it. They write an equation to represent the amount of water w (in gallons) in the pool after t hours.

$$w = -250(t - 5)$$

Problem 4.1 Looking at Patterns of Change

- A.** Answer the following questions. Explain your reasoning.
1. How many gallons of water are pumped out each hour?
 2. How long will it take to empty the pool?
 3. How many gallons of water are in the pool at the start?
- B.**
1. Write an expression for the amount of water in the tank after t hours that is equivalent to the original expression.
 2. What information does this new expression tell you about the amount of water in the tank?
 3. Which expression is more useful in this situation? Explain.

- C.** 1. Describe the pattern of change in the relationship between the two variables w and t .
2. Without graphing the equation, describe the shape of the graph. Include as much information as you can.
- D.** Suppose the equation for the amount of water w (in gallons) in another pool after t hours is $w = -450(2t - 7)$.
1. How many gallons of water are pumped out each hour?
2. How long will it take to empty the pool?
3. How many gallons of water are in the pool at the start?
4. Write an expression that is equivalent to $-450(2t - 7)$. Which expression is more useful? Explain.

ACE Homework starts on page 60.



4.2 Generating Patterns

In this problem, you are given two data points for a linear, exponential, and quadratic relationship. You will use these points to find more data points. Then you will write an equation for each relationship.